

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended): A method of investigating radioactive sources in a sample, the method comprising detecting a portion of the emissions arising from the sample at an energy, the detected portion relating to a detected level, the detected level being corrected according to a correction method to give a corrected level, at that energy, the correction method including: ~~[[-]]~~
the provision of an emission generator, passing at least a portion of the emissions of the generator into the sample, detecting at least a portion of the emissions from the generator leaving the sample, and determining a value for a first determined relationship between the two portions;
calculating a value for a relationship of equivalent type to the first determined relationship to provide a calculated relationship, the calculation being based on functions of an element's absorption of emissions and the amount of that element potentially encountered by emissions, for one or more elements;
adjusting one or more variables / functions in the calculated relationship to reduce the difference between the value of the first determined relationship and the value of the calculated relationship for the sample at a plurality of the energies of emissions from the generator, so giving a derived calculated relationship; and
obtaining the values forms of the one or more variables/functions of the derived calculated relationship ~~functions from the reduction~~ and using those forms for the variables/functions in the calculation of the value of ~~calculating~~ the calculated relationship ~~from those factors~~ at the sample source emission energy or energies requiring correction and correcting the detected level using those values for the calculated relationship.
2. (Original): A method according to claim 1 in which the generator emissions are of at least two emission energies and at least two of those energies are detected.
3. (Previously amended): A method according to claim 1 in which the calculated relationship is based on functions addressing one or more of the density, emission path length in the sample and sample absorption of emissions.

4. (Previously amended): A method according to claim 1 in which the calculated relationship is based on functions addressing one or both of the effect of the material forming the sample over the emission path length in the sample and the sample absorption of emissions.
5. (Currently amended): A method according to claim 1 in which the calculated relationship is based on the equation:[[-]]

$$T_i = \exp -\sum q_j \cdot \mu_{i,j}$$

where T_i is the transmission coefficient at the energy i under consideration; q_j is the effective material thickness or the effect of the specified material forming the sample over the specified emission path length through the sample, for element j ; $\mu_{i,j}$ is the mass absorption coefficient for elements j at energy i .

6. (Original): A method according to claim 5 in which the calculated relationship includes contributions from three or more elements, j .
7. (Currently amended): A method according to claim 5 in which the elements include at least one low atomic mass element, ~~preferably less than 10~~, at least one high atomic mass element, ~~preferably greater than 40~~ and at least one intermediate atomic mass element, ~~preferably between 10 and 50~~.
8. (Currently amended): A method according to claim 1 in which the adjusting of the variables / functions ~~/factors~~ varies one or two of the variables / functions ~~/factors~~ only.
9. (Previously amended): A method according to claim 1 in which the reduction in the differences between the first relationship value and calculated value is undertaken so as to reduce the overall difference between all of the first relationship and calculated relationship values involved.
10. (Previously amended): A method according to claim 1 in which the first relationship employs measured transmission coefficients.

11. (Currently amended): A method according to claim 10 in which the measured transmission coefficients, for one or more of the energies are provided according to the equation: [[-]]

$$\text{Trans. Coeff.} = \frac{R}{R_0}$$

where R is the rate of detected photons with the sample in a measurement place such that at least a portion of the emissions from the generator pass into the sample before being detected by the detector, R_0 is the rate of photons which would be detected without the sample in the measurement place.

12. (Currently amended): Apparatus for investigating radioactive sources in a sample, the apparatus comprising:

one or more detectors for detecting emissions from the sources, the detectors generating signals indicative of the emissions detected;

an investigating location into which the sample is introduced;

signal processing means for relating the detector signals to a detected level for the sources;

processing means for correcting the detected level for the sources, according to a correction method, to give a corrected level;

a radioactive emission generator separate from the sample;

one or more detectors for detecting emissions from the generator which leave the sample;

processing means for determining a value for a first determined relationship, based on the portion of generator emissions entering the sample and the portion of generator emissions leaving the sample;

processing means for calculating a value for a relationship of equivalent type to the first determined relationship to provide a calculated relationship, the calculation being based on functions of an element's absorption of emissions and the amount of that element potentially encountered by emissions, for one or more elements;

processing means for adjusting one or more variables/functions in the calculated relationship to reduce the difference between the value of the first determined relationship and

the value of the calculated relationship for the sample at a plurality of the energies of emissions from the generator, so giving a derived calculated relationship; and

calculating means for obtaining the ~~values~~ forms of the one or more variables/functions of the derived calculated relationship ~~functions from the reduction~~ and using those forms for the variables/functions in the calculation of the value of ~~calculating~~ the calculated relationship ~~from those factors~~ at the sample source emission energy requiring correction and correcting the detected level using that value.

13. (Canceled).

14. (Currently amended): A method according to claim 1 in which the emission energies of the generator extend across a substantial portion of the range of energies emitted from the sample, ~~preferably a substantial portion may be 50%.~~

15. (Previously amended): A method according to claim 1 in which the generator emits energies encompassing the range of energies emitted by the sample.

16. (Previously amended): A method according to claim 1 in which at least 5 energies from the generator are detected and used.

17. (Canceled).

18. (Canceled).

19. (Canceled).

20. (Canceled).

21. (Canceled).

22. (New): A method according to claim 14 in which a substantial portion is 50% of the range of energies emitted from the sample.

23. (New): A method according to claim 7 in which the at least one low atomic mass element has a mass of less than 10, the at least one high atomic mass element has a mass greater than 40, and the at least one intermediate atomic mass element has a mass between 10 and 50.